



# Graminex LLC<sup>®</sup>

## Non-Solvent Flower Pollen Extract<sup>™</sup>

### Chemical Analysis of Graminex Flower Pollen Extracts<sup>™</sup>

Graminex Flower Pollen Extracts<sup>™</sup> are natural and organic cellular food supplements. They are uniquely obtained from pollen through a non-solvent extraction process. Graminex<sup>™</sup> extracts contain a group of pollen extracts from specific plant species, chosen after careful tests to ensure consistency and standardization. Two fractions are isolated in the extraction:

- G60<sup>™</sup> = hydrophilic, water-soluble fraction
- NAX<sup>™</sup> = lipophilic, fat-soluble fraction, containing natural inhibitors which prevent rancidity.

Graminex Flower Pollen Extract<sup>™</sup> is concentrated to ensure optimum potency and clinical strength of the nutritional constituents. The amount of concentration of flower pollen in each product is to Graminex's exact specifications.

Flower pollen is the male seed of flowers which enables flowering plants to reproduce. It is produced in the upper part, or anthers, of the flower. Pollen grains contain all the substances that are necessary to create new life within the world of plants. Like a spark of energy, creating new life is still a secret to us.

Graminex Flower Pollen Extracts<sup>™</sup> are concentrates of these life-giving substances in a form which makes them easily accessible for humans. A large number of these ingredients have been discovered, and in the research work regarding the Graminex Flower Pollen Extracts<sup>™</sup>, precise analysis has been possible. Despite this fact, our knowledge on the chemical composition of flower pollen cannot be regarded as complete in every detail.

Some of the substances which can be found in flower pollen can be found in the following analysis.

#### Vitamins, Carotenoids, and Minerals:

##### **Vitamins:**

Provitamin A (carotenoids)  
B1 Thiamine  
B2 Riboflavin  
Niacin  
B6 Pyridoxine  
Pantothenic Acid  
Biotin  
B 12 (Cyanocobalamin)  
Folic Acid  
Choline  
Inositol  
Vitamin C

##### **Carotenoids:**

Alpha-carotene  
Beta-carotene  
Xanthophyll  
Zeaxanthin  
Lycopene  
Crocetin  
Cryptoxanthin

##### **Minerals:**

Calcium  
Phosphorus  
Potassium  
Sulphur  
Sodium  
Chlorine  
Magnesium  
Iron  
Manganese  
Copper  
Iodine  
Zinc

Vitamin D  
Vitamin E  
Vitamin K  
Rutin

Silicon  
Chromium  
Molybdenum  
Boron  
Titanium

### Dietary Essential Amino Acids and Physiological Essential Amino Acids:

#### Dietary Essential:

Histidine  
Isoleucine  
Leucine  
Lysine  
Methionine  
Phenylalanine  
Threonine  
Tryptophan  
Valine

#### Physiologically Essential:

Alanine  
Alpha-amino butyric acid  
Arginine  
Asparagine  
Aspartic Acid  
Cysteine  
Cystine  
Glutamic Acid

Glutamine  
Glycine  
Hydroxyproline  
Proline  
Serine  
Taurine  
Tyrosine

### Enzymes:

#### Trivial name

#### EC number\*

#### Class: Oxidoreductases

Alcohol dehydrogenase	1.1.1.1
D-Arabinitol dehydrogenase	1.1.1.11
Inositol 2-dehydrogenase	1.1.1.18
UDP-Glucose 6-dehydrogenase	1.1.1.22
Lactate dehydrogenase	1.1.1.27
Malate dehydrogenase	1.1.1.37
Isocitrate dehydrogenase (NADP)	1.1.1.42
Phosphogluconate dehydrogenase	1.1.1.44
Glucose 1-dehydrogenase	1.1.1.47
Glucose-6-phosphate dehydrogenase	1.1.1.49
Triose phosphate dehydrogenase	1.2.1.9
Malonate semialdehyde dehydrogenase	1.2.1.15
Succinate dehydrogenase	1.3.99.1
Glutamate dehydrogenase (NADP)	1.4.1.3
L-Amino-acid oxidase	1.4.3.2
Monoamine oxidase	1.4.3.4
Lipoamide dehydrogenase	1.6.4.3
Cytochrome oxidase	1.9.3.1
o-Diphenol oxidase, tyrosinase	1.10.3.1
L-Ascorbate Oxidase	1.10.3.3
Fatty acid peroxidase	1.11.1.3
Catalase	1.11.1.6
Peroxidase	1.11.1.7
Meso-inositol oxygenase	1.13.99.1

**Class: Transferases**

Aspartate carbamoyltransferase	2.1.3.2
Phosphorylase	2.4.1.25
4-alpha-glucanotransferase	2.4.1.3
UDP-Glucose-beta-glucan glycosyltransferase	2.4.1.12
Trehalosephosphate-UDP glycosyltransferase	2.4.1.15
Alpha-Glucan branching glycosyltransferase	2.4.1.18
UDP-Galactose-glucose galactosyltransferase	2.4.1.22
Aspartate aminotransferase	2.6.1.1
Alanine aminotransferase	2.6.1.2
Glycine aminotransferase	2.6.1.4
Hexokinase	2.7.1.1
Glucokinase	2.7.1.2
Xylulokinase	2.7.1.17
Phosphoribulokinase	2.7.1.19
Glucuronokinase	2.7.1.43
Nucleosidediphosphate kinase	2.7.4.6
Phosphoglucomutase	2.7.5.1
DNA Nucleotidyltransferase	2.7.7.7
UDP-Glucose pyrophosphorylase	2.7.7.9
ADP-Glucose pyrophosphorylase	2.7.7.27
Ribonuclease (RNase)	2.7.7.16

**Class: Hydrolases**

Carboxylesterase (B-esterase)	3.1.1.1
Arylesterase (A-esterase)	3.1.1.2
Lipase	3.1.1.3
Cutinase	3.1.1.74
Pectinesterase	3.1.1.11
Alkaline phosphatase	3.1.3.1
Acid phosphatase	3.1.3.2
Phytase	3.1.3.8
Trehalose-phosphatase	3.1.3.12
Phosphodiesterase	3.1.4.1
Deoxyribonuclease (DNase)	3.1.21.1
Arylsulphatase	3.1.6.1
alpha-Amylase	3.2.1.1
beta-Amylase	3.2.1.2
Cellulase	3.2.1.4
Laminarinase (Callase)	3.2.1.6
Polygalacturonase (Pectinase)	3.2.1.15
alpha-Glucosidase	3.2.1.20
beta-Glucosidase	3.2.1.21
beta-galactosidase	3.2.1.23
alpha-Mannosidase	3.2.1.24
beta-Fructofuranosidase, Invertase	3.2.1.26
Trehalase	3.2.1.28
beta-N-Acetylglucosaminidase	3.2.1.52
Laminarase	3.2.1.39
Leucine aminopeptidase	3.4.11.1
Aminopeptidase	3.4.11.2

Pepsin, Protease	3.4.23.15
Trypsin	3.4.21.4
Aminoacylase	3.5.1.14
Inorganic diphosphatase	3.6.1.1
ATPase	3.6.1.3
ATPase	3.6.1.8

**Class: Lyases**

Pyruvate decarboxylase	4.1.1.1
Oxaloacetate decarboxylase	4.1.1.3
Glutamate decarboxylase	4.1.1.15
Phosphopyruvate carboxylase	4.1.1.31
Phosphoenolpyruvate carboxykinase	4.1.1.38
Ribulose-bisphosphate carboxylase	4.1.1.39
Fructose diphosphate aldolase	4.1.2.13
Citrate synthase (synthetase)	2.3.3.1

**Class: Isomerases**

UDP-Glucose 4-epimerase	5.1.3.2
Arabinose isomerase	5.3.1.3
Xylose isomerase	5.3.1.5
Ribose 5-phosphate isomerase	5.3.1.6
Glucosephosphate isomerase	5.3.1.9

**Class: Ligases and Others**

Carboxylases	6.4.1.(1.2)
Folic acid conjugase	3.4.19.9
D-glucose-6-P- cycloaldolase (NAD+)	4.1.2.x

\* EC (Enzyme Classification) Number given by the IUBMB (International Union of Biochemistry and Molecular Biology), classes of enzymes and subclasses defined according to the reaction catalyzed.

**Different Lipid Classes:**

**Polar lipids:**

The major fractions of the polar lipids in flower pollen are lecithin, lysolecithin, phosphoinositol and phosphatidylcholine.

**Neutral lipids:**

Monoglycerides	Free fatty acids
Diglycerides	Sterols
Triglycerides	Hydrocarbons

**Fatty Acid Profile:**

**Number of C-atoms and double bonds:**

- Caprylic acid (C-8)
- Capric acid(C-10)
- Lauric acid(C-12)
- Myristic acid (C-14)

Myristoleic acid(C-14) one double bond  
 Pentadecanoic acid(C-15)  
 Pentadecenoic acid(C-15) one double bond  
 Palmitic acid(C-16)  
 Palmitoleic acid(C-16) one double bond  
 Heptadecanoic acid(C-17)  
 Heptadecanoic acid(C-17) one double bond  
 Stearic acid(C-18)  
 Oleic acid(C-18) one double bond  
 Linoleic acid(C-18) two double bonds  
 Linolenic acid(C-18) three double bonds  
 Arachidic acid(C-20)  
 Eicosenoic acid(C-20) one double bond  
 Eicosadienoic acid(C-20) two double bonds  
 Eicosatrienoic acid(C-20) three double bonds  
 Arachidonic acid(C-20) four double bonds

### Prostaglandins:

A group of hormone-like compounds derived from linoleic and arachidonic acids that influence innumerable body processes.

### Phytosterols:

Fucosterol	Cholesterol
Beta-sitosterol	Campesterol
Stigmasterol	Estrone

### Long Chain Hydrocarbons:

n-tricosane (C23)	myo-inositol
n-pentacosane (C25)	Pinitol
n-heptacosane (C27)	Sequitol
n-nonacosane (C29)	

### Streptolysin Inhibitory Factor:

From Graminex <sup>TM</sup> extract it was possible to isolate a streptolysin-inhibiting factor. The basic principle is a heat resistant factor (or SIF) with a molecular weight of 850. In vitro, it causes irreversible inhibition of the streptococcus toxins.

### Low Molecular Weight Sugars and Related Compounds:

Fructose	Maltotriose
Mannose	Glucose
Galactose	Xylose
Arabinose	Xyitole
Ribose	Xylogalacturonan
Fucose	Glucuronolactone

Hexosamine	Raffinose
Rhamnose	Stachyose
Maltotetraose	Sucrose
Maltrose	Callose
Maltose	Pinitol
Sequoyitol	

**Flavonoids:**

Quercetin	Apigenin	Dihydrokaempferol
Dihydroquercetin	Myricetin	Luteolin
Naringenin	Isorhamnetin	
P-coumaric Acid	Kaempferol	

**Growth Regulators:**

Auxins	Gibberellins
Brassins	Kinins

**Others:**

Chlorophyll	Xanthine	Nucleic Acids
Hypoxanthine	Phenolic Acids	Nuclein
Terpenes	Amines	Nucleosides
Hexadecan	Vernine	Pentosans
Guanine	Glutathione	Ferulic Acid
Indoles	Superoxide Dismutase (SOD)	Adenosine Triphosphate (ATP)
Polyphenols	Pentosans	Ellagic Acid
Phenolic Acids (Catechin, Gallio Acid)		

**Unknown:**

Some of the greatest values of Graminex™ Flower Pollen Extract and Flower Pollen may stem from elements which are for the moment still unknown to science, and from the synergistic action of all the elements working together. **IMPORTANT:** There are established Recommended Daily Allowances for many vitamins and minerals and Graminex™ Flower Pollen contains trace amounts of these ingredients.

**For more information or questions please contact us:**

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